

Appendix K: GCL



Date: 4/22/2010

Purchase Order: 13118

ORDER NUMBERS: 026119501, 026119502

Terry Ottley
Nilex Corporation

Edmonton (canada), ALB T6E 5T9
tottley@nilex.com

To Whom it May Concern:

Please find enclosed the MQA/MQC test data package for Geosynthetic Clay Liner shipments to Nilex Corporation.

The enclosed data package includes results of all the MQC tests required by ASTM D5889, with the exception of index flux/hydraulic conductivity. This test, which is run according to ASTM D5887, is normally performed once per production lot (once per week), unless a higher frequency is required by the project specifications. Because of the GCL's low permeability, this test can take several weeks to complete. The index flux/hydraulic conductivity results associated with this lot of material will be provided under separate cover as soon as they are available.

Although the index flux/hydraulic conductivity test results are not yet available, CETCO accepts responsibility for our GCL should the index flux/hydraulic conductivity tests produce unacceptable results. If, upon delivery and prior to installation, individual rolls of GCL are found to be nonconforming to accepted project specifications, CETCO will replace the nonconforming material at no charge.

Questions regarding this information should be directed to Chris Athanassopoulos, Technical Support Engineer, at (847) 851-1831.

Sincerely,

A handwritten signature in black ink, appearing to read 'Roger B. Wilkerson'.

Roger B. Wilkerson
Quality Assurance Coordinator
CETCO Lovell Plant



**GEOSYNTHETIC CLAY LINER
MANUFACTURING QUALITY ASSURANCE DATA PACKAGE**

PROJECT NAME: Nilex Corp
CUSTOMER P.O.: 13118
ORDER NUMBERS: 026119501, 026119502
PREPARED FOR: Nilex Corporation

CONTENTS:

- Product Certifications
- GCL Order packing list and MQA tracking form
- GCL manufacturing quality control test data
- Bentonite clay certification
- Raw material test results

PREPARED BY: Roger B. Wilkerson
Quality Assurance Coordinator
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Lovell, WY 82431
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PRODUCT CERTIFICATIONS

PROJECT NAME: Nilex Corp
CUSTOMER P.O.: 13118
ORDER NUMBERS: 026119501, 026119502
PREPARED FOR: Nilex Corporation

The GCL manufactured for the above-referenced order number(s) is certified to meet the values listed in the tables below:

GCL PROPERTY SPECIFICATIONS FOR BENTOMAT ST

Test Method	Test Method Property	Test Frequency	Certified Value
ASTM D 5891	Bentonite Fluid Loss	1 per 50 Tons	18 ml Max
ASTM D 5993	Bentonite Mass/Area	40,000 sq ft (4000 sq m)	0.75 lb /sq ft Min
ASTM D 5890	Bentonite Swell Index	1 per 50 Tons	24 ml/2g Min
ASTM D 6768	GCL Grab Strength	200,000 sq ft (20,000 sq m)	30 lbs/in MARV
ASTM D 6243	GCL Hydrated Internal Shear Strength	Periodic	500 psf typ @ 200 psf normal load
ASTM D 5887	GCL Hydraulic Conductivity	Weekly	5.0E-9 cm/s Max
ASTM D 5887	GCL Index Flux	Weekly	1.0E-8 m3/m2/s Max
ASTM D 6496	GCL Peel Strength	40,000 sq ft (4000 sq m)	3.5 lbs/in Min

Bentonite property tests are performed at a bentonite processing facility before shipment to CETCO's production facility.

All tensile testing is in the machine direction using ASTM D 6768. All peel strength testing is performed using ASTM D 6496. Upon request tensile and peel results can be reported per modified ASTM D 4632 using 4 inch grips.

NEEDLE DETECTION AND REMOVAL PROCEDURE

CETCO hereby affirms that all Bentomat[®] geosynthetic clay liner material manufactured for this project is continually passed under a magnet for needle removal and then screened with a metal detection device. CETCO certifies Bentomat[®] to be essentially free of broken needles and fragments of needles that would negatively effect the performance of the final product.

Roger B. Wilkerson
Quality Assurance Coordinator



GCL PACKING LIST AND MQA TRACKING FORM

Listing of finished and raw materials used to produce certification package number 000261195

GCL								Geotextiles			Clay	
LO-BENTOMAT ST								LO-N/W-WHITE-ST			LO-WOVEN-ST	LO-CG 50-ST
Order	GCL Lot #	GCL Roll #	Length	Width	weight	sq ft	Roll # Tested	Cap Lot #	Cap Roll #	Roll # Tested	Base Roll #	Clay Lot #
026119501	201007LO	52	150	15	2525	2250	40	2020584624			2020485779	020110B
026119501	201007LO	53	150	15	2525	2250	40	2020584624			2020485779	020110B
026119501	201013LO	322	150	15	2575	2250	312	201011CV	00000823	00000823	2020590594	031710A
026119501	201013LO	323	150	15	2570	2250	312	201008CV	00000608	00000607	2020590594	031710A
026119501	201013LO	324	150	15	2565	2250	312	201008CV	00000608	00000607	2020631959	031710A
026119501	201013LO	325	150	15	2585	2250	312	201008CV	00000608	00000607	2020631959	031710A
026119501	201013LO	326	150	15	2600	2250	312	201008CV	00000608	00000607	2020631959	031710A
026119501	201013LO	327	150	15	2605	2250	312	201008CV	00000608	00000607	2020631959	031710A
026119501	201013LO	330	150	15	2575	2250	329	201012CV	00000939	00000930	2020631959	031710A
026119501	201013LO	333	150	15	2540	2250	329	201012CV	00000939	00000930	2020631959	031710A
026119501	201013LO	334	150	15	2545	2250	329	201012CV	00000939	00000930	2020631959	031710A
026119501	201013LO	335	150	15	2545	2250	329	201012CV	00000939	00000930	2020631959	031710A
026119501	201013LO	337	150	15	2535	2250	329	201008CV	00000607	00000607	2020631959	031710A
026119501	201013LO	338	150	15	2540	2250	329	201008CV	00000607	00000607	2020631959	031710A
026119501	201014LO	441	150	15	2590	2250	425	201012CV	00000947	00000942	2020590110	031910B
026119501	201014LO	442	150	15	2585	2250	425	201012CV	00000947	00000942	2020590110	031910B
026119502	201016LO	488	150	15	2540	2250	488	201014CV	00001246	00001240	2020651196	040710D
026119502	201016LO	489	150	15	2525	2250	488	201014CV	00001246	00001240	2020651196	040710D
026119502	201016LO	490	150	15	2520	2250	488	201014CV	00001246	00001240	2020651196	040710D
026119502	201016LO	491	150	15	2510	2250	488	201014CV	00001246	00001240	2020651196	040710D
026119501	201016LO	492	150	15	2525	2250	488	201014CV	00001246	00001240	2020746241	040710D
026119502	201016LO	493	150	15	2525	2250	488	201014CV	00001246	00001240	2020746241	040710D
026119502	201016LO	494	150	15	2550	2250	488	201014CV	00001246	00001240	2020746241	040710D
026119502	201016LO	495	150	15	2525	2250	488	201015CV	00001311	00001302	2020746241	040710D
026119502	201016LO	496	150	15	2510	2250	488	201015CV	00001311	00001302	2020746241	040710D
026119502	201016LO	497	150	15	2510	2250	488	201015CV	00001311	00001302	2020746241	040710D
026119502	201016LO	498	150	15	2515	2250	488	201015CV	00001311	00001302	2020746241	040710D
Total sq ft:							60750	Total Number of Rolls Certified: 27				



GCL MANUFACTURING QUALITY CONTROL TEST DATA

The following rolls in GCL certification package number 000261195 have been tested in our production facility lab.

Product	Lot # Tested	Roll # Tested	Mass Area	Grab Strength	Peel Strength 6496
ASTM Test Method:			D 5993	D 6768	D 6496
Required Value:			0.75 lb /sq ft Min	30 lbs/in MARV	3.5 lbs/in Min
LO-BENTOMAT ST	201007LO	40	0.86	45.4	6.3
LO-BENTOMAT ST	201013LO	312	0.89	88.2	7.3
LO-BENTOMAT ST	201013LO	329	0.83	88.2	6.6
LO-BENTOMAT ST	201014LO	425	0.88	70.3	7.6
LO-BENTOMAT ST	201016LO	488	0.92	70.4	4.6

BENTONITE CLAY CERTIFICATION

The Bentonite Clay used to produce package 000261195

has been tested by American Colloid Company and yielded the following test results.

Clay Lot #	Moist	Swell	Fluid Loss
ASTM Test Method:	D 2216	D 5890	D 5891
Required Value:	12% Max	24 ml/2g Min	18 ml Max
031710A	10.80	24.00	18.00
031910B	11.20	24.00	17.00
040710D	10.80	25.00	15.40



GEOTEXTILE TEST RESULTS FROM MATERIAL SUPPLIERS

The GCL in certification package number 000261195 was manufactured with geotextiles which were tested with the following results.

BASE GEOTEXTILE				COVER GEOTEXTILE			
Material	Roll Number	Mass Area oz/yd2	Grab Strength lbs	Material	Roll Number	Mass Area oz/yd2	Grab Strength lbs
PPX 82TEX	2020485779	3.5	185.0	PPX 650	2020584624	7.8	153.5
PPX 82TEX	2020590110	3.4	178.1	CV-NON-WOVEN	00000607	6.9	40.2
PPX 82TEX	2020590594	3.5	174.6	CV-NON-WOVEN	00000823	6.8	30.6
PPX 82TEX	2020631959	3.4	153.9	CV-NON-WOVEN	00000930	6.5	29.6
PPX 82TEX	2020651196	3.4	146.8	CV-NON-WOVEN	00000942	6.8	35.3
PPX 82TEX	2020746241	3.3	141.6	CV-NON-WOVEN	00001240	6.4	33.0
				CV-NON-WOVEN	00001302	6.5	32.9

Certifications from our suppliers are on file at our production facility.

An '*' or 'PT' indicates supplier certifications were unavailable prior to shipping so testing was performed at a CETCO lab.



Date: 9/28/2010

Purchase Order: 00013616

ORDER NUMBER: 000266379

Terry Ottley
Nilex Corporation

Edmonton (canada), ALB T6E 5T9
tottley@nilex.com

To Whom it May Concern:

Please find enclosed the MQA/MQC test data package for Geosynthetic Clay Liner shipments to Nilex Corporation.

The enclosed data package includes results of all the MQC tests required by ASTM D5889, with the exception of index flux/hydraulic conductivity. This test, which is run according to ASTM D5887, is normally performed once per production lot (once per week), unless a higher frequency is required by the project specifications. Because of the GCL's low permeability, this test can take several weeks to complete. The index flux/hydraulic conductivity results associated with this lot of material will be provided under separate cover as soon as they are available.

Although the index flux/hydraulic conductivity test results are not yet available, CETCO accepts responsibility for our GCL should the index flux/hydraulic conductivity tests produce unacceptable results. If, upon delivery and prior to installation, individual rolls of GCL are found to be nonconforming to accepted project specifications, CETCO will replace the nonconforming material at no charge.

Questions regarding this information should be directed to Chris Athanassopoulos, Technical Support Engineer, at (847) 851-1831.

Sincerely,

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Roger B. Wilkerson
Quality Assurance Coordinator
CETCO Lovell Plant



**GEOSYNTHETIC CLAY LINER
MANUFACTURING QUALITY ASSURANCE DATA PACKAGE**

PROJECT NAME: Nilex Corp
CUSTOMER P.O.: 00013616
ORDER NUMBER: 000266379
PREPARED FOR: Nilex Corporation

CONTENTS:

- Product Certifications
- GCL Order packing list and MQA tracking form
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- Bentonite clay certification
- Raw material test results

PREPARED BY: Roger B. Wilkerson
Quality Assurance Coordinator
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PRODUCT CERTIFICATIONS

PROJECT NAME: Nilex Corp
CUSTOMER P.O.: 00013616
ORDER NUMBERS: 000266379
PREPARED FOR: Nilex Corporation

The GCL manufactured for the above-referenced order number(s) is certified to meet the values listed in the tables below:

GCL PROPERTY SPECIFICATIONS FOR BENTOMAT ST

Test Method	Test Method Property	Test Frequency	Certified Value
ASTM D 5891	Bentonite Fluid Loss	1 per 50 Tons	18 ml Max
ASTM D 5993	Bentonite Mass/Area	40,000 sq ft (4000 sq m)	0.75 lb /sq ft Min
ASTM D 5890	Bentonite Swell Index	1 per 50 Tons	24 ml/2g Min
ASTM D 6768	GCL Grab Strength	200,000 sq ft (20,000 sq m)	30 lbs/in MARV
ASTM D 6243	GCL Hydrated Internal Shear Strength	Periodic	500 psf typ @ 200 psf normal load
ASTM D 5887	GCL Hydraulic Conductivity	Weekly	5.0E-9 cm/s Max
ASTM D 5887	GCL Index Flux	Weekly	1.0E-8 m3/m2/s Max
ASTM D 6496	GCL Peel Strength	40,000 sq ft (4000 sq m)	3.5 lbs/in Min

Bentonite property tests are performed at a bentonite processing facility before shipment to CETCO's production facility.

All tensile testing is in the machine direction using ASTM D 6768. All peel strength testing is performed using ASTM D 6496. Upon request tensile and peel results can be reported per modified ASTM D 4632 using 4 inch grips.

NEEDLE DETECTION AND REMOVAL PROCEDURE

CETCO hereby affirms that all Bentomat[®] geosynthetic clay liner material manufactured for this project is continually passed under a magnet for needle removal and then screened with a metal detection device. CETCO certifies Bentomat[®] to be essentially free of broken needles and fragments of needles that would negatively effect the performance of the final product.

Roger B. Wilkerson
Quality Assurance Coordinator



GCL PACKING LIST AND MQA TRACKING FORM

Listing of finished and raw materials used to produce certification package number 000266379

GCL								Geotextiles			Clay	
LO-BENTOMAT ST								LO-N/W-WHITE-ST			LO-WOVEN-ST	LO-CG 50-ST
Order	GCL Lot #	GCL Roll #	Length	Width	weight	sq ft	Roll # Tested	Cap Lot #	Cap Roll #	Roll # Tested	Base Roll #	Clay Lot #
000266379	201037LO	3847	150	15	2680	2250	3831	2021197405			2021085825	083010B
000266379	201037LO	3848	150	15	2660	2250	3848	2021197405			2021085825	083010B
000266379	201037LO	3849	150	15	2675	2250	3848	2021197405			2021085825	083010B
000266379	201037LO	3850	150	15	2695	2250	3848	2021197405			2021085825	083010B
000266379	201037LO	3853	150	15	2770	2250	3848	2021197405			2021087597	083010B
000266379	201037LO	3859	150	15	2690	2250	3848	2021197397			2021087597	083010B
000266379	201037LO	3860	150	15	2720	2250	3848	2021197397			2021087597	083010B
000266379	201037LO	3861	150	15	2640	2250	3848	2021205042			2021087597	083010B
000266379	201037LO	3862	150	15	2635	2250	3848	2021205042			2021087597	083010B
000266379	201037LO	3863	150	15	2625	2250	3848	2021205042			2021087597	083010B
000266379	201037LO	3871	150	15	2625	2250	3865	2021205041			2021087597	083010C
000266379	201037LO	3872	150	15	2610	2250	3865	2021205041			2021087597	083010C
000266379	201037LO	3873	150	15	2615	2250	3865	2021205041			2021087597	083010C
000266379	201037LO	3874	150	15	2650	2250	3865	2021205041			2021087597	083010C
000266379	201037LO	3875	150	15	2645	2250	3865	2021205043			2021087597	083010C
000266379	201037LO	3876	150	15	2665	2250	3865	2021205043			2021087597	083010C
Total sq ft:							36000	Total Number of Rolls Certified: 16				



GCL MANUFACTURING QUALITY CONTROL TEST DATA

The following rolls in GCL certification package number 000266379 have been tested in our production facility lab.

Product	Lot # Tested	Roll # Tested	Mass Area	Grab Strength	Peel Strength 6496
ASTM Test Method:			D 5993	D 6768	D 6496
Required Value:			0.75 lb /sq ft Min	30 lbs/in MARV	3.5 lbs/in Min
LO-BENTOMAT ST	201037LO	3831	0.82	80.8	7.8
LO-BENTOMAT ST	201037LO	3848	0.86	80.8	8.3
LO-BENTOMAT ST	201037LO	3865	0.85	80.8	7.6

BENTONITE CLAY CERTIFICATION

The Bentonite Clay used to produce package 000266379

has been tested by American Colloid Company and yielded the following test results.

Clay Lot #	Moist	Swell	Fluid Loss
ASTM Test Method:	D 2216	D 5890	D 5891
Required Value:	12% Max	24 ml/2g Min	18 ml Max
083010B	11.20	26.00	16.80
083010C	10.80	26.00	16.00



GEOTEXTILE TEST RESULTS FROM MATERIAL SUPPLIERS

The GCL in certification package number 000266379 was manufactured with geotextiles which were tested with the following results.

BASE GEOTEXTILE				COVER GEOTEXTILE			
Material	Roll Number	Mass Area oz/yd2	Grab Strength lbs	Material	Roll Number	Mass Area oz/yd2	Grab Strength lbs
PPX 82TEX	2021085825	3.6	151.9	PPX 650	2021197397	6.4	110.5
PPX 82TEX	2021087597	3.5	157.4	PPX 650	2021197405	6.6	111.0
				PPX 650	2021205041	6.7	109.5
				PPX 650	2021205042	6.7	109.5
				PPX 650	2021205043	6.9	83.9

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